REMARKS/ARGUMENTS

Applicant would like to thank the Examiner for the thorough review of the present application. Based upon the amendments and the following remarks, Applicants respectfully request reconsideration of the present application and allowance of the pending claims.

The Present Invention

The present invention encompasses an automatic exposure control process for multi-dimensional imaging devices capable of operating in a multitasking environment. The process is implemented in two or more distinct modules. *The modules are a series of computer-program instructions otherwise referred to as computer software.* The image control module controls the imager by updating the imager with adjusted exposure and gain settings. The histogram processing module does the computations on the image to determine what exposure and gain settings should be targeted (i.e., calculates a new gain and exposure). A decode module provides for recognition and decoding of the image. The imager control module receives end of frame signals from an imager and the histogram processing module calculates a target contrast from gain and exposure data communicated from the imager (i.e. feedback), and image data in memory. The histogram processing module then communicates the target contrast to the imager control module. The imager control module uses the received target contrast to derive exposure and gain settings that are written to the imager.

The Office Action

The Examiner has objected to and/or rejected Claims 1-47.

Claim Objections

Claim 37 stands objected to based upon the use of the word "is" as opposed to the word "as". The Applicant acknowledges this error and has amended the claim language appropriately. Applicant wishes to thank the Examiner for discovering this error.

35 U.S.C. § 112 Second Paragraph Rejections

Claims 41-47 have been rejected under 35 U.S.C. § 112, second paragraph for insufficient antecedent basis. The Applicant acknowledges that the claims referred to the improper preceding claim. The claims have been amended to reflect the fact that they depend from Claim 38 as opposed to Claim 37. Applicant wishes to thank the Examiner for discovering this error.

35 U.S.C. § 102 (b) Rejections

Claims 1, 2, 4-11, 13-27, 29-34 and 36 stand rejected under 35 U.S.C. 102 (e) as being anticipated by United States Patent No. 6,062,475 issued to Feng. (the '475 Feng patent).

According to the Office Action, the '475 Feng patent teaches all of elements of Claim 1. Specifically, according to the Office Action, the '475 Feng patent teaches:

An imaging device for capturing optical image data (**Column 1, lines 6-14**), the device comprising:

an imager (**sensor array 48 , Figure 29B**) for generating an image signal;

a memory component (**buffer memory 274; Figure 29A**) that receives the image signal from the imager and stores the image signal as image data; and

a processor (**whole circuitry shown in Figure 29A**) that executes an exposure control routine by implementing a first module (**hardware module 38 including exposure control circuitry 254 and gain control circuitry 252 shown in Figure 29B operated under instruction executed by microprocessor 266 represented at high level software module 400, 402**) that controls the exposure and gain setting in the imager and a second module (**hardware module 316 including fuzzy logic control 334 shown in Figure 29A operated under instruction executed by microprocessor 226 represented at high level module 404, 406**) that implements computations in response to exposure data transmitted from the first module (**the exposure and gain parameters applied at the exposure and gain control circuitry in a previous frame**) to determine a targeted exposure and gain setting. (**subsequent exposure and gain parameters**).

The '475 Feng Patent Does Not Teach First and Second Modules that are Software-Exclusive Modules

The teachings of the '475 Feng patent are distinguishable from the claimed invention in that the '475 Feng patent does not teach or suggest a first module that controls the exposure and gain setting in the imager and a second module that determines a targeted exposure and gain setting., which are *exclusively executed in software*.

As noted by the Examiner, the '475 Feng patent teaches *hardware* modules in the form of gain control circuitry (252 of Figure 29A) and exposure control circuitry (254 of Figure 29B). Feng provides no teaching that gain control and exposure control can be implemented exclusively within separate software modules.

Applicant does acknowledge that the '475 Feng patent does provide two references in the specification to software. Specifically, at Column 29, lines 41-44, the specification states, "The signal may be generated by the image capture trigger circuit 28a, the dataform reading circuit 26a or by a signal generated by customer specific application software." We note that while this statement provides a passing reference to software, it provides no teaching as to how software would be implemented. The Applicant acknowledges that in order for 35 U.S.C. § 102(e) to apply the cited reference must provide for a *complete* teaching of the claimed invention. In addition, this passing reference applies to image capture and data reading and does not specifically address nor can it be assumed that the software referenced provides for gain and exposure control.

Additionally, the '475 Feng patent references software at Column 31, lines 21-25, which state, "The circuitry of the imaging assembly 18 may be embodied in software resident in one or more Ram or ROM memory chips 430 (fig. 5) mounted on the control and decoder board 22 and operated by the microprocessor 266." We note that while the statement also provides a passing reference to software, it provides no teaching as to how software would be implemented. We note that the imaging assembly 18 (Figure 29A), which the '475 Feng patent states may be embodied in software, includes power circuitry 336. The applicant fails to appreciate how power circuitry may be implemented in software. Thus, the '475 Feng patents all-encompassing statement that the entire imaging assembly 18 may be embodied in software is without teaching and, is in fact, incomprehensible in terms of certain circuits, such as the power circuit, being embodied in software.

The present invention is distinguishable, in that, the *amended claims* specifically state that the first and second modules be software-exclusive modules. The first and second modules will be implemented in the microprocessor by the multi-tasking operating system and will not require any additional hardware circuitry or hardware modules. The software-exclusive nature of the modules provides less circuitry requirements in the device that implements the gain and exposure control routines. Less circuitry results in less space utilization constraints, thus,

allowing the device that implements the modules to be small, portable, hand-held devices that are lightweight. In addition, less circuitry results in less opportunity for hardware failures in the device that may impede the gain control and exposure control functions.

For these reasons the Applicant believes that Claim 1 is clearly distinguishable from the teachings of the '475 Feng patent. The Applicant also believes that since dependent Claims 1 – 17 provide for further limitations they must be patentable as a matter of law.

According to the Examiner the '475 Feng patent teaches the additional limitations of dependent Claims 7-11 and 13. Specifically, the Examiner states that Feng patent discloses modules that are may be implemented as high or low priority tasks or threads and/or an interrupt service routine.

The '475 Feng Patent Does Not Teach or Suggest Software-Exclusive Modules that are Implemented as High or Low Priority Tasks or Threads and/or an Interrupt Service Routine.

As discussed above the teachings of the '475 Feng patent are limited to hardware module embodiments and, as such, the gain control and exposure control routines are not implemented as high priority *threads*, low priority *threads*, high priority *tasks*, low priority *tasks* or an *interrupt service routine*. As defined by the independent claim and the dependent claims the threads, tasks and interrupt service routines and executed in software-exclusive modules.

The fact that certain operations may be carried out first does not mean that the operation is a high priority task or thread. High priority does not mean that a process or routine occurs first. It means that a process is given higher priority than another process in terms of processor availability. This type of high priority and low priority processing is especially crucial in a multi-tasking operating environment in which processes compete for available processing time.

The same argument holds true for an interrupt service routine. An interrupt service routine provides for the routine to "interrupt" other routines if certain pre-defined conditions are met. The interrupt process than takes priority and is provided processing time.

Therefore, Claims 7-11 and 13 are distinguishable from the '475 Feng teachings, in that, the *amended claims* specifically state that the first and second modules be software-exclusive modules that are implemented in high or low priority tasks or threads or interrupt service routines. For these reasons the Applicant believes that Claims 7-11 and 13 are clearly distinguishable from the teachings of the '475 Feng patent.

According to the Examiner the '475 Feng patent teaches all the limitations of Claim 18 and Claim 29. Specifically, the Examiner states that the '475 Feng patent teaches feedback from a high priority module to a low priority module.

The '475 Feng Patent Does Not Teach or Suggest a Processor that Implements a High Priority Software-Exclusive Module for Real Time Control of the Imager and a Lower Priority Software-Exclusive Module that Examines the Image Signal and Provides Feedback to the High Priority Module Routine.

The Examiner relies on the analysis of Claims 1, 7 and 10 to find novelty lacking in independent Claim 18 and independent claim 29. As previously noted, the teachings of the '475 Feng patent are limited to hardware modules or hardware circuits. Additionally, the fact that certain operations may be carried out first does not mean that the operation is a high priority task or thread. High priority does not mean that a process or routine occurs first. It means that a process is given higher priority than another process in terms of processor availability. This type of high priority and low priority processing is especially crucial in a multi-tasking operating environment in which processes compete for available processing time.

In the present invention the high priority and low priority modules are implemented by a multi-tasking operating system. A scheduler within the multi-tasking operating system can direct the processor to preempt the lower priority module and give preference to the higher priority module. In this regard, the scheduler will insure that when the processor completes the task or thread within the higher priority module it will continue executing the lower priority module at the point where the lower priority module was preempted. Thus, the scheduler insures that the well-defined order of operations carried out by the lower priority module are persevered, even in the instance in which the lower priority module is preempted.

Thus, the '475 Feng patent provides no teaching of a high priority module for real time control of the imager and a lower priority module that examines the image signal and provides feedback to the high priority module. Accordingly, the Applicant believes that Claim 18 and claim 29 are clearly distinguishable from the teachings of the '475 Feng patent. The Applicant also believes that since dependent Claims 30-35 provide for further limitation they must be patentable as a matter of law.

According to the Examiner the '475 Feng patent teaches all the limitations of Claim 19. The Examiner relies of the analysis of Claims 1,

The '475 Feng Patent Does Not Teach a First Software-Exclusive Module that Controls the Gain and Exposure and a Second Software-Exclusive Module that Calculates a Target Contrast in Response to the EOF Signal, the Captured Contrast Setting and the Stored Image Data

The teachings of the '475 Feng patent are distinguishable from the claimed invention in that the Feng patent does not teach a first software-exclusive module that controls the exposure and gain setting in the imager and a second software-exclusive module that calculates a target

contrast setting in response to the end of frame signal, the captured contrast setting and stored image data.

As previously noted the '475 Feng patent is limited to hardware module teachings. As such, the applicant fails to appreciate how the Feng patent teaches calculation of a target contrast in response to the end of frame signal, the captured contrast setting and stored image data.

For these reasons the Applicant believes that Claim 19 is clearly distinguishable from the teachings of the '475 Feng patent. The Applicant also believes that since dependent Claims 20-28 provide for further limitation they must be patentable as a matter of law.

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35 U.S.C. § 103 (a) Rejections

Claims 3, 37-45 and 47 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over the '475 Feng patent in view of United States Patent No. 5,227,614 issued to Danielson et al. (the '614 Danielson patent).

The Examiner relies on the '614 Danielson patent to show a handheld device that is provided with a multi-tasking operating system. Dependent Claims 3 and independent claim 37 add the further limitation of a multi-tasking operating system.

While the Applicant acknowledges that the '614 Danielson patent teaches a device with a multi-tasking operating system, the Danielson patent does not teach the operating system implementing a software-exclusive multi-tasked exposure control routine. The Examiner relies on the '475 Feng patent for a teaching of the multi-tasked exposure control routine.

As previously noted, the '475 Feng patent is limited to a teaching of hardware modules in the form of hardware circuits. Thus, the '475 Feng patent provides no teaching of a software-

exclusive multi-tasked exposure control routine. In this regard, the '475 Feng patent provides no teaching of low and high priority threads or tasks or interrupt service routines by executed by a software-exclusive multi-tasked exposure control routine.

For these reasons the Applicant believes that Claims 3 and 37 are clearly distinguishable from the teachings of the '475 Feng patent in combination with the '614 Danielson patent. The Applicant also believes that since dependent Claims 38-47 provide for further limitation they must be patentable as a matter of law.

New Claims 49-53

New independent Claim 49 is presented to further define the invention and to further distinguish the invention from the cited references.

As noted, while the Applicant acknowledges that the '416 Danielson patent teaches a device implementing a multi-tasking operating system, the patent provides no teaching or suggestion of the operating system executing a first software-exclusive module that provides imaging system control processing and a second software-exclusive module that recognizes and decodes the image data.

Additionally, the '416 Danielson patent is limited to a teaching of capturing and reading linear bar codes. The present invention, as claimed in Claim 49, is capable of reading and capturing two-dimensional barcode data symbols.

The '475 Feng patent provides no teaching of a first software-exclusive module that provides imaging system control processing and a second software-exclusive module that recognizes and decodes the image data. The Feng teachings are limited to hardware embodiments.

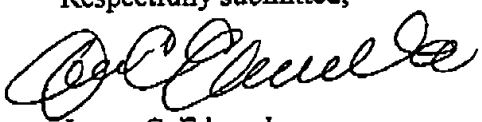
Therefore, Applicant believes that the newly presented claims are distinguishable from the '475 Feng patent, the '614 Danielson patent and any combination thereof. The Applicant also believes that since dependent Claims 50-53 provide for further limitation they must be patentable as a matter of law.

Conclusion

In view of the proposed amended claims and the remarks submitted above, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicant's undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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